IN THE SPECIFICATION:

Please replace the full paragraph starting on page 30, line 17, with the following:

Carbon monoxide may be introduced into the first zone 114 of the chamber 112 through a carbon monoxide line 122. As discussed above, the carbon monoxide may be supplied from the valve 62 of the shale reduction apparatus 10, or from any other source within the scope of the present invention. The oil shale in the chamber 112 may be heated from the combustion of carbon monoxide along with minimal amounts of hydrogen and with oxygen which originates in the first zone 114 of the chamber 112. The heat that is derived from reactions 1a and 2a may be conveyed from the first zone 114 to the third zone 118 by means of gases that may be generated through a series of reactions that occur in the first zone 114 and the second zone 116. The hydrocarbons in the shale may be heated by the sensible heat in these gases, which flows countercurrent to the shale, transferring sufficient heat to vaporize the hydrocarbons completely before the shale passes downward to the first zone 114. This is characterize by reaction 4. These vapors may be drawn off from the upper end of the third zone 118 through a first gas re-circulation line 140. Also, spent heat conveying gases, mainly hydrogen and carbon monoxide, may be directed through the first gas re-circulation line 140 by

means of a first blower 142. The gases may be transferred to the lower end of the second zone 116 through the first gas re-circulation line 140. As the gases and hydrocarbon vapor discharge from the first gas re-circulation line 140 and enter the second zone 116 they may be met ~~meet~~ with a blast of super hot gases from the first zone 114. These gases may heat the hydrocarbon vapor above a temperature for which it may be decomposed into free hydrogen and carbon. This reaction, R3, may absorb about 5,000 cal/CH_2 and similarly about 5,000 calories for each segment of the chain of the molecular structure, in compounds of the methane series of hydrocarbons. The carbon may precipitate forming a coke coating on the shale as it tumbles along the chamber 112. The hydrogen may be re-circulated with the carbon monoxide through the third zone 118, conveying more sensible heat to vaporize the hydrocarbons. A portion of the hydrogen and carbon monoxide may also be withdrawn through ports in the shell of the chamber 112 into an effluent gas output line or path 148. These gases may be at an appropriate temperature to be further processed down stream. This process is described in greater detail below.

On page 33, starting on line 3, please replace the full paragraph with the following:

Super heated oxygen may be injected into the first zone 114 from an oxygen pre-heater 128. The flow of oxygen may be controlled by an oxygen valve 132. The oxygen may ascend upward through hot descending spent shale in the oxygen pre-heater 128. Reactions 1a and 2a may occur in the first zone 114, producing much thermal energy, carbon dioxide and super heated steam. These hot gases may impinge on the coke or carbonized shale resulting in reactions 1b and 2b, to take place producing carbon monoxide and hydrogen and consuming the carbureted material along with absorbing considerable quantities of thermal energy. A portion of these gases may be re-circulated through the second gas re-circulation line 144 by means of the second blower 146. The combustion of theses gases with oxygen may furnish all the thermal energy for the reactions, both chemical and physical, that take place in the chamber 112. The summation of the energy released from reaction 1a and 1b may be approximately 53,600 cal/mole of oxygen consumed. This may be far excessive for the thermal requirements of the process. To compensate for this excessive energy and to convert the excessive thermal energy to a useful chemical energy and moderate the climate in first zone 114, a flow of steam may be introduced into a steam pre-heater 128a. The steam may also be super heated by hot spent shale which may be ejected from the first zone 114 through the oxygen pre-heater 128, and on into the steam pre-heater 128a. The steam

may be derived from a boiler 154. The boiler 154 may include a series of tubes for receiving water. As the hot effluent from the catalytic converter 152 ~~chamber 112~~ is passed through the boiler 154, the heat from the effluent may be absorbed by the water in the tubes. Accordingly, the temperature of the effluent may be reduced and steam may be generated.

On page 44, please replace the paragraph starting on line 1 and ending on page 45, line 6 with the following paragraph:

The hydrogen and carbon monoxide discharged from the chamber 112 into the gas output line 148 may be conveyed to the particle separator 150 in route to an inverted conical collector 212 of a ferrous deoxidizer 226, through conduit 214 and a blower 216. The hydrogen and carbon monoxide may then percolate up in the ferrous deoxidizer 226 through multiple fluidized beds of magnetite which progressively move downward. The hydrogen and carbon monoxide remove the oxygen from the magnetite reducing the Fe_3O_4 to Fe. The hydrogen and carbon monoxide may be oxidized to H_2O and CO_2 characterized by reactions R7 and R8. Portions of these gasses may be discharged through conduit 218 through blower 219 into the steam pre-heater 128a. The remaining gas may be discharged through conduit 221. This hot gas along with the heat combined from the hot gases conducted through conduits 220 and

222 may furnish the heat necessary to generate steam in a heat extracting apparatus 224. It will be appreciated that the heat extracting apparatus 224 may be comprised of any variety of heat exchanger or cooling device known in the art for extracting heat, and possibly generating steam. The steam may be injected ~~back~~ into a ferrous ~~deoxidizer 226~~ oxidizer 228, also referred to as a hydrogen generator or metallic iron chamber 228. This steam may react with metallic iron in ~~a~~ the metallic iron chamber 228 generating hydrogen and magnetite characterized by reaction R9. The iron may serve as a vehicle to carry oxygen from the H_2O in the metallic iron chamber 228 to the carbon monoxide and hydrogen into ferrous deoxidizer 226. This process may generate a near pure virgin hydrogen and magnetite in the metallic iron chamber 228, and carbon dioxide, steam and metallic iron in the ferrous deoxidizer chamber ~~230~~ 226.

On page 46, starting on line 9, please replace the two full paragraphs with the following:

The gases ejected from the chamber 112 may be 500 degrees C or above and the summation of reactions R7 and R8 may be slightly exothermic. Reaction R9 may be somewhat more exothermic. The volumes of the gases entering the ferrous deoxidizer 226~~, also referred to as a hydrogen generator,~~ may be equal to the volume

exiting it. The thermal energy exiting the hydrogen generator 228 and ferrous deoxidizer 226 may exceed the requirement to generate steam for the hydrogen generator 228 ~~226~~. After heat is extracted from these gases, the waste may be disposed and the hydrogen may be cooled in cooler 242, compressed using a compressor 244, and stored in a storage tank 246 for distribution.

It will be understood that other materials besides iron may be used to carry oxygen from the H_2O in the hydrogen generator ~~226~~ 228 within the scope of the present invention.

On page 47, please replace the paragraph starting on line 1 and ending on page 48, line 3 with the following paragraph:

Those having ordinary skill in the relevant art will appreciate the advantages provide by the features of the present invention. For example, it is a feature of the present invention to provide a process and apparatus for producing hydrogen from oil shale that produces a nearly pure hydrogen ~~is simple in design and operation~~. It is an additional feature of the present invention to provide a process and apparatus for producing hydrogen from oil shale that is efficient in use of heat and fuel. It is a further feature of the present invention to provide a process and apparatus for extracting oil from oil shale

that is simple in design and operation. It is another feature of the present invention, in accordance with one aspect thereof, to provide such an apparatus that can produce an excess of carbon monoxide for use as a commercial fuel in other industries. It is an additional feature of the present invention, in accordance with one aspect thereof, to provide such an apparatus that minimizes the presence of gases that are nonessential to the extraction of oil from oil shale. It is a further feature of the present invention, in accordance with one aspect thereof, to provide such an apparatus that is capable of recovering unused heat produced in a combustion phase of the oil extraction process. It is an additional feature of the invention, in accordance with one aspect thereof, to provide such an apparatus in which a reactant in the process is regenerated and is reusable in the process.

Please replace the abstract with the following: